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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/658,803
Filing Date: September 09, 2003
Appellant(s): SARKAR ET AL.

Paul F. Rusyn
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 09/04/07 appealing from the Office action mailed June 05, 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

This appeal involves claims 1-12. Claim 13 has not been presented for review.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

A substantially correct copy of appealed claims 1-12 appears on pages 1-3 of the Appendix to the appellant's brief. The minor error is as follows: Claim 13 is not involved in the appeal.

(8) Evidence Relied Upon

2002/0164523	SHIBATA et al	11-2002
2002/0028367	SAMMES et al	03-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the appellant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the appellant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-9 and 11-12 are rejected under 35 U.S.C. 102(e) as being anticipated by Shibata et al 2002/0164523.

The present application is directed to an anode-supported solid oxide fuel cell wherein the disclosed inventive concept comprises the specific anode support layer.

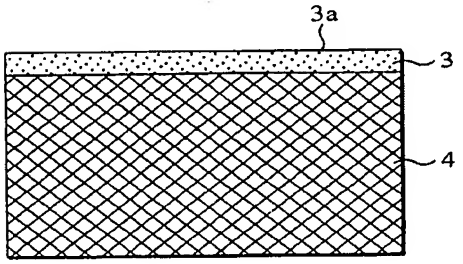
As to claims 1 and 12:

Shibata et al disclose a unit cell for a solid electrolyte fuel cell including an air electrode, a fuel electrode and a solid electrolyte sandwiched therebetween, and a porous metallic base body joined at least one of the air electrode and the fuel electrode (ABSTRACT). The porous metallic base body serves to pass fuel gas to be supplied to the fuel electrode while allowing a cell power output to be collector from a reacting area (ABSTRACT). The solid oxide electrolyte is also disclosed (P. 0002).

Shibata et al further disclose that porous metallic base body is formed of a laminated body that includes more than two (2) layers of porous base body layers of the same kinds having different porosity rates or of the different kinds (P. 0047). It is disclosed that the layers provide the supporting and gas-flow passage functions (P. 0047/CLAIM 1). *Thus, the layers must have vias extending through the thickness dimension.*

Figure 7 illustrates the porous metallic base body taking the form of a laminated structure that includes a first surface layer, having an electrode forming layer 3a, adapted to be held in contact with an associated electrode, and a second surface layer 4 with is porosity rate different from that of the first surface layer (P. 0047).

FIG.7



Disclosed is that the porous metallic base body is made of nickel, silver and a W-based alloy and/or alloy thereof (P. 0044). *Thus, the porous metallic base body does contain a catalytic and electronically conductive material.*

Shibata et al teach the use of ceramic which is plated with the above metals or alloy thereof to make the porous metallic base body (P. 0044). EXAMPLE 1 shows the combined use of a ceramic (alumina) with Ni and Ag (See EXAMPLE 1).

As to claim 2:

Disclosed is that the porous metallic base body is made of nickel, silver and a W-based alloy and/or alloy thereof (P. 0044). *Thus, the porous metallic base body does contain a catalytic and electronically conductive material.*

As to claim 3:

Shibata et al teach the use of ceramic which is plated with the above metals or alloy thereof to make the porous metallic base body (P. 0044). EXAMPLE 1 shows the combined use of a ceramic (alumina) with Ni (See EXAMPLE 1).

As to claim 4:

Shibata et al disclose a unit cell for a solid electrolyte fuel cell including an air electrode, a fuel electrode and a solid electrolyte sandwiched therebetween, and a porous metallic base body joined at least one of the air electrode and the fuel electrode (ABSTRACT).

As to claims 5-6:

Shibata et al show in EXAMPLE 1 that the fuel electrode along with the porous metallic base body contains Ni-8%YSZ (See EXAMPLE 1). *Thus, anode support layer structure, as a whole, contains the claimed material uniformly distributed throughout the anode itself.*

As to claims 7-8:

Disclosed is that the porous metallic base body is made of nickel, silver and a W-based alloy and/or alloy thereof (P. 0044). *Thus, the porous metallic base body does contain a catalytic and electronically conductive material.*

Shibata et al further disclose that porous metallic base body is formed of a laminated body that includes more than two (2) layers of porous base body layers of the same kinds having

different porosity rates or of the different kinds (P. 0047). *The difference in porosity is associated with gradient concentration of the materials forming the porous metallic base body.*

As to claim 9:

Shibata et al show in EXAMPLE 1 that the fuel electrode along with the porous metallic base body contains Ni-8%YSZ (See EXAMPLE 1). *Thus, anode support layer structure, as a whole, contains the claimed material uniformly distributed throughout the anode itself.*

Additionally, **Figures 10A and 10B** illustrates porous base bodies 1 and 2 comprising surface layers having pore rates of 60 %, 50 %, 70 %, 74 % and even 92 % (See Figures 10A-B). *Hence, Shibata et al provides specific guidance about the porosity of the layers comprising the porous base bodies.*

As to claim 11:

It is disclosed that the layers provide the supporting and gas-flow passage functions (P. 0047/CLAIM 1). *Thus, the layers must have vias extending through the thickness dimension.*

Thus, the present claims have been anticipated.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Appellant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 7-8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata et al 2002/0164523 as applied to claim 4 above, and further in view of Sammes et al 2002/0028367.

Shibata et al is applied, argued and incorporated herein for the reasons above. However, Shibata et al does not expressly disclose the specific amount of the nickel-based material; and the specific gradient of Ni concentration.

As to claims 7-8:

Sammes et al disclose an electrode-supported solid state electrochemical cell (TITLE) being an anode-supported solid oxide fuel cell having (ABSTRACT). Disclosed is that each of the anode layers may comprise a ratio of electrochemically active substance to electrolyte substance, with such ratios being higher for layers that are layered further from a surface of the anode that contacts a fuel gas than for layers that are layered closer to the fuel gas (P. 0012). The support layer may comprise a higher ratio of YSZ to nickel, and the active layer may comprise a lower ratio (P. 0017, 0059-0060/ FIGURE 4)

As to claim 10:

Sammes et al specifically disclose that the layer may comprise from 0-50 % volume of nickel (P. 0017). **FIGURE 4** shows with sufficient specificity Ni volume percents ranging from

much greater than 0 % vol to much less than 100 % vol, and specifically, from 10-30 % vol (See FIGURE 4). *Thus, Figure 4 provides specific guidance as to the amount of Ni.*

In view of the above, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the specific amount of the nickel-based material of Sammes et al in the porous metallic base body of Shibata et al as Sammes et al disclose that the specific amount of Ni is necessary to maintain a satisfactory degree of electrochemical activity. That is, to obtain a solid oxide fuel cell with a higher electrochemical activity.

As to the specific gradient of Ni concentration, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the specific gradient of Ni concentration of Sammes et al in the porous metallic base body of Shibata et al as Sammes et al teach that such Ni concentration gradient is effective to produce high electrochemical activity while matching the thermal characteristics of the electrolyte layer. Thus, such Ni concentration gradient provides a compositional balance from one layer to another so as to prevent the nickel layer from splitting away from the electrolyte layer upon heating while also maintaining suitable electrochemical activity through the layers.

(10) Response to Argument

1. Care has been exercised to consider and examine all of the arguments and evidence in the form of appendixes presented or raised by the Appellant in the Appeal Brief dated 09/04/07. However, appellant's arguments are not persuasive to overcome the prior art rejection.

2. As a matter of introduction, the Examiner wishes to distinctively point out that the critical aspect of the invention which is under contention is whether a disclosed material is capable of showing ionically/electronically conductive properties regardless of whether it is classified as a

poor conductive material. Another point of contention is whether the language "ion conducting" or "electronically conductive material" recited in independent claims 1 and 12 of the present application clearly defines the degree of conductivity apparently claimed by the appellant. Appellant is reminded that although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

With respect to these two issues, the Examiner has repeatedly requested or solicited to the Appellant to furnish objective, sound or technical information or data showing that the material in question (i.e. alumina) is INCAPABLE of conducting electrons or that it (alumina) completely lacks a conducting mechanism in its microstructure to fully inhibit or prevent the conduction of electrons through or along its microstructure, thereby being TOTALLY (100 %) UNABLE to transport ions. To date, no such evidence has been positively furnished by the Appellant which has come forward only with technical literature explaining that alumina is a poor conductor and that materials, in general, are classified as having certain characteristics and are not classified in absolute terms. Furthermore, not only did appellant fail to provide the requested evidence but he/she acknowledged that "*No such evidence can be provided for any material. Although classified as a particular type of material, every material will exhibit some characteristics of another class of materials. For example, materials classified as electrical insulators exhibit some amount of electrical conductivity, but such conductivity is so small that these materials are nonetheless classified as insulators*" (See Appellant's Brief dated 09/04/07, 1st full paragraph of page 8). Thus, appellant himself/herself has admitted that regardless of the classification of a

material, materials classified as electrical insulators exhibit some amount of electrical conductivity (←Emphasis added).

The Examiner now has proved his point; and in view of the foregoing, the Examiner continues to contend that in the absence of a claimed or specified degree of conductivity it is impossible to determine whether appellant's conducting material legally describes a high conducting material or a low conducting material. There is no dispute that appellant's material is conductive but it is immediately unclear whether the material intended by the appellant exhibits low conducting properties or high conducting properties. This and only this has been the essence of the disputed issue. The Examiner does not agree with the arguments postulated by the Appellant about the classification of material in view of the sufficiently legal description a claim must have to be patentably distinct from the prior art. There is simply no suggestion or indication from the claim language to support Appellant's position that his/her material is intended to follow material classification. In other words, other than knowing that appellant's material is capable of conducting ions or electrons, the present claims as instantly drafted are wholly silent about the specific class of material they intend to recite or the degree of conductivity required to operate the solid oxide fuel cell. As such, all of the appellant's arguments concerning this matter are not effective to overcome the rejection supra.

3. In response to appellant's argument that the references fail to show certain features of appellant's invention, it is noted that the features upon which appellant relies (i.e., a) "*oxygen ion conducting*"; b) "*yttria stabilized zirconia (YSZ)*") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir.

1993). Thus, some of the appellant's arguments are not commensurate in scope with the disputed independent claims.

4. A point not contemplated by the Appellant is that Shibata et al does teach forming a fuel cell unit comprising a porous base body combined with other conductive materials (P0044 and EXAMPLE 1); and that the language of the present claims makes no distinction between the ion-conducting structure, the catalytic and the electronically conductive material so as to fairly stipulate whether they can be made of the same or different materials. Thus, the construction material of the ion-conducting structure, the catalytic and the electronically conductive material are by no means materially different from each other, meaning that the catalytic material can be the same as the electronically conductive material and/or the ion-conducting structure, or vice-versa. For instance, Shibata et al teach the use of ceramic which is plated with the above metals or alloy thereof to make the porous metallic base body (P. 0044). EXAMPLE 1 shows the combined use of a ceramic (alumina) with Ni and Ag (See EXAMPLE 1). Disclosed is that the porous metallic base body is made of nickel, silver and a W-based alloy and/or alloy thereof (P. 0044). *Thus, the porous metallic base body does contain a catalytic and electronically conductive material and includes multiple materials as a whole capable of exhibiting suitable ionic and electronically conductivity.*

5. Additionally, the degree of interaction at respective interfaces of the porous base body 1 comprising the ceramic body plated with Ni being coated with the electrode 10 (Ni-8%YSZ) makes it possible to obtain the conductive properties of the claimed anode because the anode as a whole does include the porous base body coated with Ni (taken as the catalytic and the electronically conductive material) and YSZ (taken as the ion conducting material incorporated

into the porous base body). And Shibata et al's anode material are essentially the same as the materials employed to make the anode support layer of the Appellant. *Thus, the porous metallic base body does contain a catalytic and electronically conductive material and includes multiple materials as a whole capable of exhibiting suitable ionic and electronically conductivity.*

Accordingly, products of identical chemical composition can not have mutually exclusive properties, and thus, the claimed properties (i.e. *ion conducting and electronically conductive*), is necessarily present in the prior art material. "*Products of identical chemical composition can not have mutually exclusive properties." A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present. In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).* ***See MPEP 2112.01 [R-3] Composition, Product, and Apparatus Claims***

6. The main contention of appellant's arguments focuses primarily on the assertion that "*In Shibata et al, the nickel and/or ceramic material is integrally formed into the base body; therefore one would expect a cross-sectional micrograph of the base body to reveal or structure with a porous homogeneous composition. In contrast, a micrograph of an anode-support layer as presently claimed will reveal a porous structure (for example, YSZ) having at least some of the pores filled with a catalytic and electronically conductive material (for example, nickel, copper, silver, tungsten). In other words, the anode support layer has a non-homogeneous structure*". However, this assertion is not sufficient to overcome the prior art of record for the reasons that follow. First, in paragraph bridging pages 7-8 of the amendment dated 05/15/06, appellant admitted on the record that "*In Shibata et al, the nickel and/or ceramic material is*

integrally formed into the base body". Thus, appellant's admission implies that the base body and nickel and/or ceramic material (the catalytic material or conductive material) of Shibata et al are in direct physical contact, in the same manner that appellant's catalytic/conductive material and porous structure is. As such, the specific method of making it (i.e. by impregnation) adds nothing of significance to the present product claims in the absence of objective evidence demonstrating that such a method produces a product exhibiting either superior characteristics and/or a different unobvious structure.

In this respect, although appellants are entitled to define a product by using particular process/method limitations, what is given patentably consideration is the product itself and not the manner in which the product was made. In this case, the references are teaching substantially the same product and constituents as the product made by the method of the instant claims. Therefore, the patentability of a product is independent of how it was made. Thus, burden is on appellants to show differences in product-by-process claims as well as in product comparisons. Further, even though the prior are may fail to disclose other physical properties, in view of the substantially similar products being disclosed in the instant application, the examiner has a reasonable basis to suspect that the claimed product and Shibata et al products would be substantially the same. Since PTO does not have proper equipment to carry out the analytical tests, the burden is then shifted to appellants to provide objective evidence demonstrating the claimed product is necessarily different from the prior art's product, and that the difference is unobvious ***(Refer to MPEP 2113: Product-by-Process Claims)***.

(Emphasis supplied→) Accordingly, the examiner also asserts that it is not enough that appellant's representative personally believes that "*one would expect a cross-sectional*

micrograph of the base body to reveal a structure with a porous homogeneous composition" rather than a non-homogenous structure as the inventive anode support layer. That is to say, the arguments of counsel cannot take the place of evidence in the record. An assertion of what seems to follow from common experience is just attorney argument and not the kind of factual evidence that is required to rebut a prima facie case of inherent anticipation/obviousness (See ***MPEP 716.01 and 2145: Consideration of Appellant's Rebuttal Arguments***).

7. Additionally, the examiner wishes to mention that the term "*impregnated*" stands for either being filled or saturated (to cause to be filled or saturated) as defined by Merriam-Webster's Collegiate Dictionary (10th Edition). Therefore, appellant's recitation that "*the anode support layer comprising a porous ion-conducting structure having pores impregnated with a catalytic and electronically conductive material*" merely requires that the pores of appellant's anode support layer be filled with the catalytic/electronically material. Hence, since appellant has admitted on the record that "*In Shibata et al, the nickel and/or ceramic material is integrally formed into the base body*", it is emphatically averred that Shibata et al's porous structure is also filled with either nickel and/or ceramic material. To that extent, Shibata et al's porous-filled anode support structure provides the necessary structural interrelationship to satisfy the claimed requirement.

8. Appellant has also contended on page 8 (last full paragraph) of the 05/15/06 amendment that "*there is no disclosure of any vias that are filled with electronically conductive material*". In response, appellant is reminded that nickel (Ni) is a conductive metallic material (element) and that appellant's specific electronically conductive material is not presently recited in the independent claim 12. Thus, such a conductive metallic material (Ni) disclosed by Shibata et al

in combination with the silence of independent claim 12 to clearly set forth the specific electronically conductive material leads the examiner to rebut such a contention by simply pointing out that the nickel material of Shibata et al satisfy the claimed requirement.

9. In response to appellant's argument that the references fail to show certain features of appellant's invention, it is noted that the features upon which appellant relies (i.e., a) "*specific electronically conductive material*"; b) "*Shibata does not disclose the existence of vias or channels*") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). *This is to address appellant's intention to equate the word "vias" to "channels" in terms of structure and functionality.*

10. In response to appellant's argument that "*While Example 1 discloses an electrode 10 having a nickel-zirconia composition, the porous base body 1 is made of a different material. Paragraph 69 of Shibata et al discloses the porous base body 1 to include a ceramic (alumina) body plated with Ni*", the examiner rebuts appellant's arguments by stating that appellant is overlooking the fact that paragraph 0069 of Shibata et al discusses that "*the porous base body 1 includes a ceramic body with Ni and is coated with the electrode material (Ni-8%-YSZ)*" (←emphasis supplied). Therefore, the electrode coating is deposited into the pores of the porous base body of Shibata et al. Hence, Shibata et al' porous base body contains portions of electrode material therein and that electrode material is interpreted by the examiner to constitute appellant's cermet buffer layer. Appellant is again reminded that the language of the present claims do not exclude using the same electrode material for adding or disposing additional "buffer layers". Moreover, paragraph 0047 of Shibata et al directly teach to use laminated bodies

including more than two (2) layers. More significantly, Shibata et al discloses in paragraph 0047 that "*Here, the porous metallic base body layer covered with the air electrode and/or the fuel electrode is referred to as the first surface layer*". As a consequence, it is further contended that Shibata et al at once envisage a laminated structure having multiple layers including a layer made of an electrode material deposited over the metallic base body. As such, that at-once-envisaged combination of teachings including at least one layer of the electrode material is taken by the examiner to represent appellant's "buffer layer".

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Raymond Alejandro

Conferees:

Pat Ryan

William Krynski